Analysis of Placental Structures by Ultrasound in Normal and Complicated Pregnancies

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Grey scale echography allows to study the intrauterine dimensions of the placenta as it is possible to separate the chorionic plate, marginal areas and the basal plate from the surrounding structures. Subject of the present study were the progress of placental growth in the last third of pregnancy and the changes in placental tissue structure. 267 placentas of 157 gravidas were examined at various stages of gestation. 4372 longitudinal and transversal section scans were done - on an average 15 scans of one placenta. The anterior wall placenta of a patient was scanned in steps of 2 cms in longitudinal just as in transverse direction (Fig. 1).

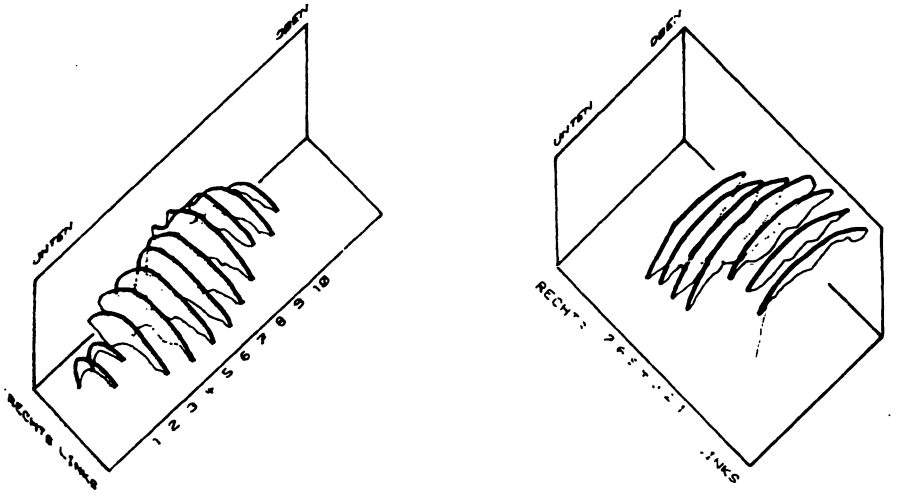

Abb. 1: Model of transverse (left) and longitudinal (right) section scans of a placenta

The scans were stored on a video tape and measured by means of a X-Y-digitizer, outlining the placenta on each scan. The implantation area, total surface and the placental volume were calculated.
The sonographical tissue structure of each single section scan was differentiated by a scored scheme of five different signs in a four-step graduation (Fig. 2). The degree of appearance of each criterion in a section scan was brought in relation to its part of the whole placental volume.

Results

Fig. 3 demonstrates the increase of placental volume during pregnancy by means of a mathematically fitted growth curve including the standard deviation. The gestational age was calculated not only by the term of the last menstruation, but also by the progress of the fetal biparietal diameter. There is no growth of placental volume beyond the 34th w.o.g.
The placental volumes of pregnancies complicated by diabetes B, C or D according to the WHITE scheme are represented by the "D" letters, the "S" letters show the volumes of the placentae of small for gestational age infants who finally had a birthweight below 2700 g.

0300-5577/81/0091-0040 $ 2.00

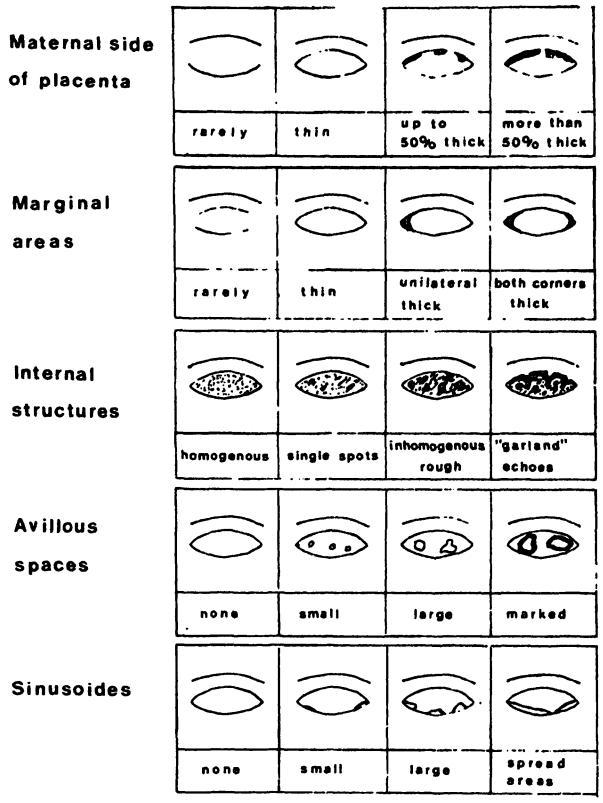

Abb. 2: Scheme of the five criteria of placental tissue structure

In 152 patients the last sonographic examination was done two weeks or less before delivery. Analyzing the five criteria of placental structure we established a group of inconspicious pregnancies with non-pathological fetal outcome and a pathological one including fetal distress, operative delivery, small-for-date and stillbirth. Three of the five criteria proved to be of small value under clinical aspects: The existence of marked marginal areas, avillous spaces and sinusoids was not connected with remarkable differences concerning the fetal outcome. Significant differences between both groups were found, however, as to "maternal side of placenta" and "internal structures". If 75 per cent or more of the placental tissue are sonographically described as grossly inhomogenous or even interspersed with garland echoes a significant difference in fetal outcome between the normal and the pathological groups was found. Similar differences between those groups could be demonstrated in those cases in which besides the utero-placental borderline was apparently thicker.

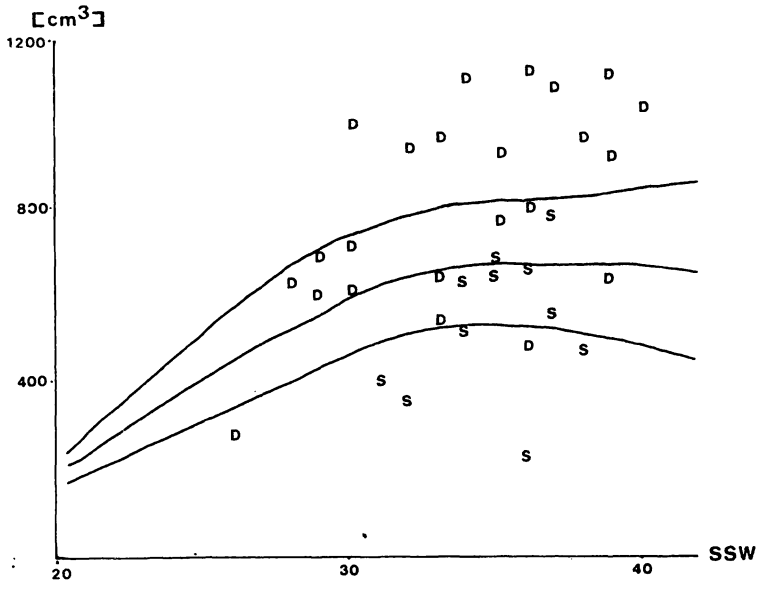

Abb. 3: Growth of placental volume with single s. d.

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